

Powers (G. A.)

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OF THE HUMERUS.

A PLEA FOR ITS EMPLOYMENT IN EVERY
RECENT CASE.

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CHARLES A. POWERS, M.D.,

SURGEON TO THE OUT-PATIENT DEPARTMENT, NEW YORK HOSPITAL.



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KOCHER'S METHOD OF REDUCING SUBCORACOID DISLOCATIONS OF THE HUMERUS—A PLEA FOR ITS EMPLOYMENT IN EVERY RECENT CASE.¹

CONSIDERATION of the various forms of the luxations which occur at the shoulder-joint, their causation, mechanism, pathology, and immediate and subsequent treatment, is without the scope of this brief paper. In the few moments which are at my disposal I shall call your attention to but one point, the reduction of the subcoracoid form by the method known as "Kocher's."

And I venture to assert that there is no surgical procedure of equal simplicity and of like importance as little known to the profession of our country as is this.

In the *Berliner Klinische Wochenschrift* for February, 1870, Professor Theodor Kocher, of Berne, first published the results of his cadaveric researches regarding the mechanism of this dislocation, and gave to the profession the most logical, scientific, and successful plan for its reduction which has yet been presented.

His theory is that the end to be attained in attempts at reduction is to open the rent in the capsule and to relax its intact portions without employing force.

When the head of the bone passes from the glenoid cavity to beneath the coracoid process, it rends the capsule at its inner and lower part. The rent extends to the insertion of the tendon of the subscapularis, lacerating some of the fibres of the structure.

Tension in the capsule is greatest at its upper part,

¹ Read before the Medical Society of the State of New York, at its Eighty-third Annual Meeting, February 6, 1889.

between the tendon of the long head of the biceps and the upper border of the subscapularis.

The posterior portion of the capsule and the tendons which reinforce it are preserved and stretched across the glenoid cavity. At the point of greatest tension the capsule is reinforced by the coraco-humeral ligament.

When, in a given case of subcoracoid luxation, the arm is adducted and strongly rotated out, the rent in the capsular ligament will be freely opened ; but as the upper and lower parts of the capsule are yet tense the head of the bone remains firmly fixed against the anterior edge of the glenoid cavity. If, however, the arm is brought forward and upward across the chest, the upper part of the capsule relaxes ; but the lower part, being yet tense, serves as a fixed point about which the head of the bone revolves and thus slips into its cavity.

Professor Kocher turned this anatomical knowledge to account in formulating the following procedure¹ for the reduction of a humerus, the head of which rests beneath the coracoid process.

Suppose the right shoulder to be the seat of the injury. The patient is seated and the surgeon kneels beside him. With his left hand he grasps the arm of the patient just above the elbow. The patient's forearm being flexed to a right angle, the surgeon firmly seizes the wrist with his right hand. Then adducting the elbow to the body he utilizes the lever furnished by the forearm and rotates the arm out until firm resistance is met (practically until the forearm makes an angle of ninety degrees with the antero-posterior plane of the body). Now, with the arm still strongly rotated out, he brings the elbow forward and upward in the sagittal plane across the chest, and finally

¹ This procedure Kocher modestly calls a modification of Schinzing's, but it differs in a most important particular. The first two movements are alike in both, but at the end of external rotation (second movement) Schinzing has an assistant draw the head of the bone into its place by means of a fillet, or he grasps and forcibly presses it outward.

rotates the arm in, and places the patient's hand on, his opposite shoulder.

This procedure I would amend by placing the patient squarely on his back, with both shoulders resting on a firm table, and as there is a great tendency for him to turn his body to the affected side during the external rotation of the arm, I think it well that the opposite shoulder be held down. This may be done by a bystander. It is well, also, that downward traction¹ be added to adduction of the elbow in the first movement.

The manipulation is shown in Figs. 1, 2, 3, and 4. I am indebted to Dr. C. C. Page, assistant at the Chambers Street Hospital, and to my pupil, Mr. T. B. Enders, for their kind assistance in the matter of the illustrations.

The following case will serve as an example: A muscular porter, aged twenty-six, presented himself at the Chambers Street Hospital with the history of having fallen forcibly on the external aspect of the right shoulder twenty minutes previously, the arm being at the time of injury abducted to about seventy-five degrees.

Examination revealed a typical subcoracoid dislocation of the right arm. There was the usual prominence of the acromion with a hollow beneath it, the head of the humerus was both seen and felt beneath the coracoid process of the scapula. The elbow was abducted thirty degrees from the body. The affected arm was about one-eighth of an inch shorter than its fellow. No fracture could be detected. The patient having well relaxed his muscles, Kocher's procedure was employed as above described. As the arm underwent external rotation the contour of the shoulder became fuller, and at the beginning of the third movement (sweeping the elbow forward across the chest with the arm still in external rotation—Fig. 3) a distinct crackling sound was heard and the head easily slipped into the glenoid fossa. The patient said that he experienced very little pain. The crackling sound, of

¹ Jersey: New York Medical Journal, September, 1883.

which mention is made, is very often heard as the head goes back. It has been thought by some writers to be due to a progressive laceration of the capsule, but this I



FIG. 1.—First Movement. The elbow is adducted to the body and drawn downward. (The arm and wrist should be firmly grasped, as shown in the figure.)

think incorrect, for it does not occur while the capsule is at its greatest tension. I think it simply bony crepitation produced by the slipping of the head of the humerus across the anterior margin of the glenoid fossa.

In a later article ¹ Professor Kocher lays additional stress on the importance of the coraco-humeral ligament, and, likening it to the ilio-femoral ligament of the hip-joint,



FIG. 2.—Second Movement. The arm is rotated out until firm resistance is met. (Practically until the long axis of the forearm points directly outward.)

says that the subcoracoid dislocation at the shoulder corresponds to the obturator dislocation at the hip.

In a minute description of the coraco-humeral ligament

¹ Volkmann's Sammlung klinischer Vorträge Chirurgie, 1-28.

he says that it assumes the form of an inverted Y, the outer limb of which is a strong, tense band of fibres passing between the upper part of the glenoid fossa and the



FIG. 3.—Third Movement. With the external rotation of the arm still maintained, the elbow is carried forward and upward on the chest.

greater tuberosity. (It has heretofore been confounded with the tendon of the supraspinatus, which stretches across this part of the capsule.) The tension of this outer limb "wedges in" the head of the humerus beneath the coracoid process. The other part of the Y runs to the

lesser tuberosity and the adjacent capsule. Fibres pass between them which correspond to the zona orbicularis at the hip.



FIG. 4.—Fourth Movement. The hand is placed on the sound shoulder.

The internal limb is the stronger, and limits external rotation.

Professor Kocher says that when the coraco-humeral ligament is ruptured, or the anterior portion of the cap-

sule severely torn, the procedure fails because the humerus loses the fixed point about which it should revolve.

Farabeuf,¹ however, has come to a conclusion diametrically the opposite of this. He proved upon the cadaver, and showed to the Surgical Society of Paris, that though all of the anterior ligaments be cut the procedure succeeds; but when the posterior portion of the capsule is divided the head simply revolves in external rotation but fails to enter its normal cavity. He contends that the success of Kocher's procedure is due to the integrity of the posterior portion of the capsule. That when the first movement, or adduction, is made, this portion is made tense. That in the second movement the head is turned outward around the lower fixed point of the ligament, and in the third movement it simply undergoes an external excursion through the rent at the inner part of the capsule and into the glenoid cavity.

Through the courtesy and with the assistance of Dr. George B. Phelps, Jr., Demonstrator of Anatomy at the Woman's Medical College, experiments were made upon the cadaver, with a view to proving the correctness of one or the other of these assertions.

Upon one shoulder we divided subcutaneously the capsule at its inner and lower part, and threw the head of the humerus beneath the coracoid process. Kocher's procedure easily replaced it. We then cut the coracohumeral ligament and the anterior part of the capsule, but employment of the procedure was equally successful in reducing the dislocation. Upon another shoulder the posterior part of the capsule was divided, after the head of the bone had been dislocated forward, yet it was replaced by Kocher's manœuvre as easily as were the others. It was only after the capsule had been almost completely divided that external rotation failed to meet with resistance.

Through lack of time but few experiments were made,

and their results are unsatisfactory and inconclusive. I hope in the near future to make an additional communication upon this interesting point.

In the article above referred to in "Volkmann's Sammlung," Professor Kocher states that since his original paper he has adopted the procedure in thirteen cases, in eleven of which reduction was easily effected and without the aid of an anæsthetic. In a still later article ¹ he places added emphasis on the value of the manipulation, and avers that it is applicable to old cases as well as to those of recent date. In the original paper he contended that it was inapplicable to the intracoracoid cases (the subclavicular of English writers); but he now states that it does succeed in these if the elbow be adducted in the posterior axillary line during the first movement.

Ceppi ² concludes that all known methods for the reduction of this luxation are inferior to that of Professor Kocher, and in a later article ³ says that further experience only strengthens this opinion.

Kaufmann ⁴ says that when correctly applied the method is always successful, and that without the aid of an anæsthetic. He cites eleven cases reduced by him.

Carafi ⁵ says, "thanks to the method of Kocher, the reduction of recent subcoracoid dislocations is now one of the simplest procedures in practical surgery." He had used it with success in twenty cases, and recommends that in the subclavicular cases the arm be held for two or three moments in the position of external rotation.

Davezac ⁶ employed it with success in several instances, and recommends that it be applied to every recent case.

¹ Transactions of the International Medical Congress, vol. ii., 1881.

² De la réduction des luxations sous-coracoidiennes, traumatiques, simples et récentes. Paris, 1878.

³ Revue de Chirurgie, 1882, No. 10.

⁴ Centralblatt für Chirurgie, 1881, No. 30.

⁵ Revue de Chirurgie, 1881.

⁶ Journal de Médecine de Bordeaux, No. 32, p. 351.

Poinsot,¹ Perrier,² and Ferron,³ strongly endorse the method, but add nothing of moment.

Mr. C. Heath⁴ relates five cases occurring in his service at the University College Hospital, in three of which the bone was replaced at the first attempt and without ether, while, in the other two an anaesthetic was given.

Mr. Pick⁵ considers the plan the simplest for the reduction of shoulder dislocations, but incorrectly states that it is applicable to the subglenoid variety as well as to the subcoracoid.

All writers agree that the procedure fails when the capsule is severely torn, and in support of this permit me to cite to you the following case :

A muscular man, twenty-eight years of age, sought treatment at the Chambers Street Hospital, January 23, 1889, with a history of having recently had the left shoulder caught between an elevator and a beam, and subjected to severe pressure, the arm at the time being abducted. The shoulder was the seat of a typical subcoracoid dislocation. Kocher's method was tried, but was unsuccessful. During the second movement (external rotation) no resistance was met. The method also failed under ether, and the arm was replaced by direct traction at a right angle.

The lack of resistance during external rotation seems very good evidence of severe injury to the capsule.

Its Employment at the Chambers Street Hospital, New York.—Early in 1883 a description of the method came under the notice of Dr. William T. Bull,⁶ the Attending Surgeon to the Hospital, and under his direction its employment was commenced and continued. The first case was that of a man, seventy years of age, who presented himself at the hospital March 3, 1883. His subcoracoid

¹ *Traité des Fractures et Luxations* d'Hamilton.

² *Thèse de Paris*, 1884.

³ *Revue de Médecine et de Chirurgie militaires*, 1882.

⁴ *Lancet*, April 14, 1883, p. 634.

⁵ *Fractures and Dislocations*, p. 375.

⁶ The Dr. Bull should be accredited as introduction in this country

humerus was so quickly and easily replaced in its normal cavity that surprise and delight found place in the minds of all who observed the procedure. Since then the method has been used to the exclusion of all others. The results in the first six months were published by Dr. Charles A. Jersey, in the *New York Medical Journal* for September 23, 1883, in an article entitled, "Twenty-one Cases of Subcoracoid Dislocation of the Humerus reduced by Kocher's Method." In seventeen of the twenty-one cases the reduction was effected at the first attempt, in the other four the bone went back at the second, third, fourth, or fifth attempt, respectively. In none was an anæsthetic used.

During the five years ending with October 1, 1888 (the five years following the publication of Jersey's paper), 173 recorded cases of recently dislocated humerus find place in the history books of the Chambers Street Hospital. Of these, 44 were subglenoid and 129 subcoracoid.

The results of treatment in the subcoracoid cases are as follows :

Without ether, Kocher's manipulation, successful at first attempt.....	98
Without ether, Kocher's manipulation, successful at second attempt	6
Without ether, Kocher's manipulation, successful at third attempt.....	8
Without ether, Kocher's manipulation, successful at fourth attempt	1
Failed without ether, with ether successful at first attempt. . .	6
“ “ “ traction at a right angle, successful.....	5
“ “ “ foot in axilla, successful.....	1
“ “ “ the head undergoing extreme external rotation ¹ slips into axilla and is then reduced as axillary	1
Kocher not tried, success by traction at a right angle	3
	<hr/>
	129

We thus see that of the 126 cases in which the procedure was resorted to it was successful in 98 cases, or 77 +

¹ Doubtless a case in which the capsule was severely torn.

per cent., at the first attempt, and that without the aid of an anæsthetic. Let us, however, make due allowance for the fact that these dislocations were reduced by some twenty five different gentlemen, each of whom numbered in this list his "first case," on which, perhaps, he failed at **first attempt**.

Let us assume, moreover, that the list is not entirely free from diagnostic errors, and that more than one case which is classed as subcoracoid, was, in reality, an axillary luxation.

From the personal reduction of a not inconsiderable number of these cases, and the observation of many more, I am fully prepared to share the opinion of the authors to whom I have referred, that "in a recent simple case, the manipulation should prove successful at the first attempt, without anæsthesia."

In none of these cases was an injury inflicted on the **axillary vessels or nerves**.

Recital of them would be devoid of interest. Most of them occurred in muscular laborers;¹ many of the patients presented themselves in a state of intoxication, and either strenuously resisted manipulation, or absolutely refused it without the influence of an anæsthetic. These considerations aid in accounting for the "first attempt" failures, for those cases in which ether was given.

Causes of Failure.—1. Muscular rigidity. 2. Extensively torn capsule. 3. Fracture complicating the dislocation. 4. Error in diagnosis. 5. Failure to properly adduct the elbow, or to sufficiently rotate the arm out. 6. Inward rotation of the arm before completion of the third movement. 7. Dislocation of such long standing that adhesions have formed about the head and neck of the bone.

Conclusions.—1st. Of the various luxations which the

¹ It is not unnecessary to call attention to the patient's fact, that before attempting the reduction of any dislocation the patient's member should be thoroughly relaxed. In ignorant or frightened subjects this is often difficult of attainment.

humerus undergoes the subcoracoid is much the most common.

2d. The method to be employed in its reduction is, *par excellence*, that of Kocher, and it should be used in every recent case.

3d. The procedure is logical and safe. It may easily and rapidly be carried out. Its careful, accurate, and thorough employment will almost invariably assure success at the first attempt.

4th. It will not succeed in those cases, happily uncommon, in which the capsular ligament is severely torn.

5th. The patient should be in the dorsal position.

6th. An anæsthetic is unnecessary.

7th. The aid of a skilled assistant may be dispensed with. It is advisable that the opposite shoulder be steadied, but this can be done by a layman.

8th. It is attended with the least possible pain to the patient.

9th. It is practically without danger to the important vessels and nerves.

10th. The question as to whether its success depends on the integrity of the anterior or of the posterior part of the capsule must yet be considered *sub judice*.

11th. It rarely succeeds in the subglenoid form.

12th. It is applicable to the intracoracoid cases, but in those the elbow should be placed behind the posterior axillary line (Kocher) and external rotation should be maintained for two or three minutes (Carafi).

13th. In all cases in which much resistance is met with during the early part of the second movement the position of external rotation should be steadily maintained for a short period before bringing the arm forward and across the chest.

